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Michael Zöbisch

March 22, 2005

PCT-Application No.: PCT/IB03/06227

Applicant: TOYOTA JIDOSHA KABUSHIKI KAISHA

Our ref: WO 40173

(Frist: 27.03.05 R66 PCT)

This is in reply to the Official Communication dated
January 27, 2005.

Herewith a new set of claims (1 to 24) is filed, which
shall form the basis for the further proceedings.

Furthermore, a copy of the set of claims (1 to 24) is
filed, in which amendments are indicated by extinction and
underlining, respectively.

The new set of claims is based on former claim 8. Former
claim 26 was made dependent on former claim 8. Former
claims 1 to 7 were implemented into former claim 26 and
succeeding claims respectively.

The new set of claims comprises one independent apparatus
claim 1, pertaining to a cylinder head in which a water
jacket is formed, having an outer cylinder head defining a
side of the water jacket opposite the cylinder head.

According to the Written Opinion this claim was considered
to be novel by the Examiner.

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Furthermore, the set of claims comprises one independent apparatus claim 6, pertaining to a engine main body including among others a cylinder head forming a cylinder top portion side of a water jacket and an outer cylinder block defining an outer side of the water jacket.

Both independent claims have the feature that an outer side of the water jacket of the cylinder head is defined by an outer cylinder block, of course comprising an outer cylinder head. This technical feature defines a new contribution with respect to the claimed inventions, which considered as a whole, is new over the prior art. Therefore, besides novelty and inventive step, the new set of claims also should fulfill unity.

Aurel Vollnhals
Patentanwalt
TBK-Patent

Enclosures:

- Amended set of claims (claims 1 to 24)
- Amended set of claims (claims 1 to 24) with amendments indicated

Enclosure of March 22, 2005

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New claims 1 to 24, amendments indicated

10 81. A cylinder head in which a water jacket is formed
around a cylinder top portion, and which, combined with a
separate cylinder block (210), forms an engine main body,
the cylinder head characterized by comprising:

15 a main body cylinder head (208) which has a mounting
surface and which defines a cylinder top portion side of
the water jacket, and

20 an outer cylinder head (206) which is molded
separately from the main body cylinder head (208) as a
cylinder head portion which defines a side of the water
jacket opposite the cylinder side, the outer cylinder head
being arranged in a predetermined position so as to be on
the mounting surface (224) of the main body cylinder head
(208) so as to define, together with the main body cylinder
head (208), the water jacket, the outer cylinder head (206)
25 to be fixed in place while pressed between the cylinder
block (210) and the main body cylinder head (208) while
arranged in the predetermined position.

30 92. The cylinder head according to claim 81,
characterized in that a positioning portion for determining
a mounting position of the outer cylinder head (206) with
respect to the main body cylinder head (208) is formed on
at least one of the main body cylinder head (208) and the
outer cylinder head (206).

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103. The cylinder head according to claim 8-1 or claim 92, characterized in that the outer cylinder head (206) is formed of a resin or a resin composite.

5 114. The cylinder head according to claim 8-1 or claim 92, characterized in that the outer cylinder head (206) is formed of one or two or more materials selected from the group consisting of an aluminum alloy, a magnesium alloy, a resin, a resin composite, and a ceramic.

10 125. The cylinder head according to any one of claims 8-1 to 114, characterized in that the main body cylinder head (208) is molded by casting using an aluminum alloy or a magnesium alloy.

15 136. An engine main body which includes a cylinder block (110) in which a water jacket (150a, 150b) is formed around a cylinder (112), and a cylinder head in which the water jacket (150a, 150b) is formed around a cylinder top portion, the engine main body characterized by comprising:

20 a main body cylinder block (104) which has a mounting surface and which defines a cylinder side of the water jacket (150a, 150b);

25 a main body cylinder head (108) which has a mounting surface and which forms a cylinder top portion side of the water jacket (150a, 150b); and

30 an outer cylinder block (106) which is molded separately from the main body cylinder block (104) and the main body cylinder head (108) as a cylinder block portion which defines a side of the water jacket (150a, 150b) opposite the cylinder (112) side and the cylinder top portion side, the outer cylinder block (106) being arranged in a predetermined position so as to be between the mounting surface of the main body cylinder block (104) and
35 the mounting surface of the main body cylinder head (108)

so as to define, together with the main body cylinder block (104) and the main body cylinder head (108), the water jacket (150a, 150b), the outer cylinder block (106) being fixed in place while pressed between the main body cylinder block (104) and the main body cylinder head (108) while
5 arranged in the predetermined position.

147. The engine main body according to claim 136, characterized in that a positioning portion for determining
10 a mounting position of the outer cylinder block (106) with respect to the main body cylinder block (104) is formed on at least one of the main body cylinder block (104) and the outer cylinder block (106).

158. The engine main body according to claim 13-6 or claim 147, characterized in that the outer cylinder block (106) is formed of a resin or a resin composite.
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169. The engine main body according to claim 13-6 or claim 147, characterized in that the outer cylinder block (106) is formed of one or two or more materials selected from the group consisting of an aluminum alloy, a magnesium alloy, a resin, a resin composite, and a ceramic.
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1710. The engine main body according to any one of claims 13-6 to 169, characterized in that the main body cylinder block (104) is molded by casting using an aluminum alloy or a magnesium alloy.
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1811. The engine main body according to claim 1710, characterized in that the main body cylinder block (104) has a cylinder liner cast into a bore portion of the main body cylinder block (104).
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1912. The engine main body according to claim 1710, characterized in that a bore portion of the main body cylinder block (104) is surface treated so as to be wear-resistant.

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2013. The engine main body according to any one of claims 13-6 to 1912, characterized in that the main body cylinder head (108) is molded by casting using an aluminum alloy or a magnesium alloy.

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2114. The engine main body according to any one of claims 13-6 to 2019, characterized in that the outer cylinder block (106) is fixed between the main body cylinder block (104) and the main body cylinder head (108) with a fastening bolt (152).

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~~22. An engine main body characterized by comprising the cylinder block according to any one of claims 1 to 7 and a cylinder head, the outer cylinder block (406) being fixed between the main body cylinder block (404) and the cylinder head with a fastening bolt.~~

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2315. The engine main body according to any one of claims 13-6 to 2214, characterized in that sealing material (435) or welding is used to seal between the main body cylinder block (404) and the outer cylinder block (406).

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2416. An engine main body characterized by comprising the cylinder head according to any one of claims 8-1 to 12 5 and a cylinder block, the outer cylinder head (206) being fixed between the cylinder block and the main body cylinder head (208) with a fastening bolt.

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2517. The engine main body according to claim 2416, characterized in that sealing material or welding is used

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to seal between the main body cylinder head (208) and the outer cylinder head (206).

2618. An engine main body ~~which includes a cylinder block (210) in which a water jacket is formed around a cylinder, and a cylinder head in which the water jacket is formed around a cylinder top portion, the engine main body characterized by comprising:~~

~~the cylinder block (210) which has a mounting surface and which defines a cylinder side of the water jacket;~~

~~a main body cylinder head (208) which has a mounting surface (224) and which defines the cylinder top portion side of the water jacket; and~~

~~an outer cylinder head (206) which is molded separately from the main body cylinder head (208) as a cylinder head portion which defines a side of the water jacket opposite the cylinder side, the outer cylinder head (206) being arranged in a predetermined position so as to be on the mounting surface of the main body cylinder head (208) so as to define, together with the cylinder block (210) and the main body cylinder head (208), the water jacket, the outer cylinder head (206) being fixed in place while pressed between the cylinder block and the main body cylinder head (208) while arranged in the predetermined position. comprising a cylinder head according to any of the claims 1 to 5,~~

1. Aa cylinder block (210) in which a water jacket (50; 450) is formed around a cylinder (12; 412), and which, combined with a separate cylinder head (8), forms an engine main body (2), the cylinder block characterized by comprising:

wherein the cylinder block has

a main body cylinder block (4; 404) which has a mounting surface (24; 424) and which defines a cylinder (12; 412) side of the water jacket (50; 450), and

an outer cylinder block (6; 406) which is molded separately from the main body cylinder block (4; 404) as a cylinder block portion which defines a side of the water jacket (50; 450) opposite the cylinder (4; 412) side, the outer cylinder block (6; 406) being arranged in a predetermined position so as to be on the mounting surface (24; 424) of the main body cylinder block (4; 404) so as to define, together with the main body cylinder block (4; 404), the water jacket (50; 450), the outer cylinder block (6; 406) to be fixed in place while pressed between the cylinder head (8) and the main body cylinder block (4; 404) while arranged in the predetermined position.

219. The engine main body ~~The cylinder block~~ according to claim ~~118~~, characterized in that a positioning portion (28) for determining a mounting position of the outer cylinder block (6; 406) with respect to the main body cylinder block (4; 404) is formed on at least one of the main body cylinder block (4; 404) and the outer cylinder block (6; 406).

320. The engine main body ~~The cylinder block~~ according to claim ~~1-18~~ or claim 219, characterized in that the outer cylinder block (6; 406) is formed of a resin or a resin composite.

421. The engine main body ~~cylinder block~~ according to claim ~~1-19~~ or claim 220, characterized in that the outer cylinder block (6; 406) is formed of one or two or more materials selected from the group consisting of an aluminum alloy, a magnesium alloy, a resin, a resin composite, and a ceramic.

522. The engine main body ~~cylinder block~~ according to
any one of claims ~~1-18~~ to 421, characterized in that the
main body cylinder block (4; 404) is molded by casting
5 using an aluminum alloy or a magnesium alloy.

623. The engine main body ~~cylinder block~~ according to
claim 522, characterized in that the main body cylinder
block (4; 404) has a cylinder liner (22; 422) cast into a
10 bore portion of the main body cylinder block (4; 404).

724. The engine main body ~~cylinder block~~ according to
claim 522, characterized in that a bore portion of the main
body cylinder block (4; 404) is surface treated so as to be
15 wear-resistant.